What is claimed is:

1. A radio frequency (RF) passive power combiner, comprising:

a first orthogonal mode transducer (OMT) configured to accept RF from two driver circuits;

a first polarization rotator, capable of adjusting the phase of each of the two RF signals from said first OMT; and

a second OMT configured to couple energy impinging on its input ports into two output conductors.

2. The passive power combiner of claim 1, further comprising:

a first slip connection between said first OMT and said polarization rotator, that provides a low-VSWR rotating connection between said devices; and

a second slip connection between said polarization rotator and said second OMT, that provides a low-VSWR rotating connection between said devices.

3. The passive power combiner of claim 1, further comprising:

a first choke coupling between said first OMT and said polarization rotator, that provides a low-VSWR rotating connection between said devices; and

a second choke coupling between said polarization rotator and said second OMT, that provides a low-VSWR rotating connection between said devices.

4. The passive power combiner of claim 1, further comprising:

a first input coaxial line connection sized to carry the power burden for the feed signal from said first driver circuit to said first OMT; and

a second input coaxial line connection sized to carry the power burden for the feed signal from said second driver circuit to said first OMT.

5. The passive power combiner of claim 1, further comprising:

a first output coaxial line connection sized to carry the power burden for the output signal produced by said combiner from a first port of said second OMT; and

a second output coaxial line connection sized to carry the power burden for the output signal produced by said combiner from a second port of said second OMT.

6. The passive power combiner of claim 1, further comprising:

a first input waveguide connection sized to carry RF at the frequency for the feed signal from said first driver circuit to said first OMT; and

a second input waveguide connection sized to RF at the frequency for the feed signal from said second driver circuit to said first OMT.

7. The passive power combiner of claim 1, further comprising:

a first output waveguide connection sized to carry RF at the frequency for the output signal produced by said combiner from a first port of said second OMT; and

a second output waveguide connection sized to carry RF at the frequency for the output signal produced by said combiner from a second port of said second OMT.

8. The passive power combiner of claim 1, further comprising:

a first input coupler configured to couple the RF signal from said first driver circuit by way of said first input coaxial line into the circular waveguide constituting said first OMT; and

a second input coupler configured to couple the RF signal from said second driver circuit by way of said second input coaxial line into the circular waveguide constituting said first OMT.

9. The passive power combiner of claim 1, further comprising:

a first output coupler configured to couple the RF signal present at said first output port in said second OMT into said first output coaxial line; and

a second output coupler configured to couple the RF signal present at said second output port in said second OMT into said second output coaxial line.

10. The passive power combiner of claim 1, further comprising a pin-type polarization rotator located between the input and output OMTs.

11. The passive power combiner of claim 1, further comprising a dielectric-type polarization rotator located between the input and output OMTs.

12. The passive power combiner of claim 10, wherein said pin-type polarization rotator comprises a single row of pins mounted in a rotatable waveguide section attached to the input and output OMTs by slip connections.

13. The passive power combiner of claim 10, wherein said pin-type polarization rotator comprises a multiplicity of single rows of insertable pins mounted in a fixed waveguide section attached to the input and output OMTs.

14. The passive power combiner of claim 13, wherein insertion of none of said rows of insertable pins in said pin-type polarization rotator establishes a first phase shift and effective rotation angle for each of the signals introduced on the input ports, said phase shift and effective rotation angle determining the

proportion of the energy from each input port that is directed to each of the output ports.

15. The passive power combiner of claim 13, wherein insertion of any one of said rows of insertable pins in said pin-type polarization rotator establishes a phase shift and effective rotation angle for each of the signals introduced on the input ports, said phase shift and effective rotation angle determining the proportion of the energy from each input port that is directed to each of the output ports.

16. An apparatus for combining high-power RF transmission signals, comprising:

means for coupling two high-power RF transmission signals into a confining chamber configured to sustain propagation of two signals with orthogonal polarization;

means for rotating the phase of both of said coherent signals by an amount equal for each signal to twice the angle between the signal and the rotating means while permitting propagation of said signals to proceed; and

means for coupling said high-power UHF transmissions out of said confining chamber.

17. The signal combining apparatus of claim 16, wherein said apparatus further comprises means for phase shifting and effectively rotating both of said high-power RF transmission signals to such angles as to allow substantially all of the energy from both of said signals to be coupled out on a first output path.

18. The signal combining apparatus of claim 16, wherein said apparatus

further comprises means for phase shifting and effectively rotating both of said high-power RF transmission signals to such angles as to allow substantially all of the energy from both of said signals to be coupled out on a second output path distinct from the first output path.

19. The signal combining apparatus of claim 16, wherein said apparatus further comprises means for phase shifting and effectively rotating both of said high-power RF transmission signals to such angles as to allow substantially all of the energy from each of said signals to be coupled out on an output path distinct from that on which the energy of the other signal is coupled.

20. A method of combining RF signals, comprising the following steps:

coupling coherent, orthogonally spaced RF signals to propagate within a circular waveguide;

combining these RF signals by differentially rotating the two signals until they add;

placing additional coupling devices at a second position in a dimension-controlled chamber; and

coupling the combined signal or any components thereof out of the system using the coupling devices at the second position within the chamber.

21. The RF signal combining method of claim 20, further comprising the step of phase shifting and effectively rotating both of the RF transmission signals to such angles as to allow substantially all of the energy from both of the signals to be coupled out on a first output path.

22. The RF signal combining method of claim 20, further comprising the step

of phase shifting and effectively rotating both of the RF transmission signals to such angles as to allow substantially all of the energy from both of the signals to be coupled out on a second output path distinct from the first output path.

23. The RF signal combining method of claim 20, further comprising the step of phase shifting and effectively rotating both of the RF transmission signals to such angles as to allow substantially all of the energy from each of the signals to be coupled out on an output path distinct from that on which the energy of the other signal is coupled.